

Measures of Availability of Health Care Services for Children

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ABSTRACT

OBJECTIVE: The Children's Health Insurance Program Reauthorization Act (CHIPRA) mandates that measures of availability of child health services be included in the recommended core measurement set. The objective of this work was to review and evaluate measures of availability of child health services for potential inclusion in the initial core set of health care quality measures as mandated by CHIPRA.

METHODS: To find measures, I searched the published literature, measurement sets, and recommended articles to identify existing measures of availability. I comment on the use of these measures as well as their reliability and validity (where available).

RESULTS: I identified measures of geographic availability (n = 11), timeliness (n = 7), and barriers (n = 4). Geographic measures range from counts of the number of providers in a specific area to measures that account for whether providers are open to caring for patients with public insurance and distance. Measures of

timeliness address whether patients can see a provider quickly. Barriers measure the ease with which providers can be seen.

CONCLUSIONS: Of potential use to the CHIPRA measurement initiative are objective measures of provider density and some existing parent survey questions about timeliness and ease of use. Other measures include more refined measures of density or distance, perhaps looking at providers who are taking new Medicaid and State Children's Health Insurance Program patients and more detailed questions about the timeliness and ease with which patients can get care. However, more work is needed on the validity and reliability of existing measures; more work is also needed to expand measures of availability beyond existing domains of providers and conditions.

KEYWORDS: availability; health care; pediatric; provider density

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THE CHILDREN'S HEALTH Insurance Program Reauthorization Act¹ required that the secretary of Health and Human Services (HHS) publish by January 1, 2010, an initial list of recommended child health care quality measures for voluntary use by state Medicaid and Children's Health Insurance Program (CHIP) programs for public comment. The legislation mandated that the recommended core measurement set include measures of availability of child health services. In response to that requirement, this paper was commissioned by the Agency for Healthcare Research and Quality (AHRQ) for use by the National Advisory Council for Healthcare Research and Quality Subcommittee on Children's Healthcare Quality Measures for Medicaid and CHIP Programs (SNAC), a time-limited subcommittee charged with recommending an initial core set to the secretary of HHS for consideration for public posting. Because the time available to the SNAC and HHS was so short, AHRQ asked for a highly focused review of literature to identify potential measures of availability of services; to assess their validity, reliability, and feasibility; and to make recommendations of measures that would meet standard health care quality measurement criteria as well as additional criteria in Children's Health Insurance Program Reauthorization Act (CHIPRA). This paper

summarizes the work done for AHRQ. It puts availability of services within traditional conceptual frameworks of quality measurement and access, and it summarizes findings on the feasibility, reliability, and validity of availability measures from a focused review of the health services literature and compendia of health care quality measures.

We know that some children are not able to obtain health care services because they are not available. This is particularly true for some services (eg, mental health, dental, some pediatric subspecialty care), for some geographic locations (eg, very rural areas), and for some populations of children (eg, children covered by Medicaid). Having services available is a necessary but not sufficient step toward "realized access" or the use of needed services.

Donabedian created a widely used framework for understanding health care quality by categorizing measures into the domains of structure, process, and outcomes.² Structural measures are most relevant to availability. Structure includes measures such as the number of providers (by geography or population), provider policies about office hours, telephone access, acceptance of different types of insurance, and the prices at which services such as immunizations will be provided, distance to providers, number and density of hospitals, and the structure of insurance coverage. Availability can

also be considered using the conceptual framework put forth by Anderson and Aday.³ This framework suggests that utilization of health care is driven by 3 groups of factors—predisposing, need, and enabling—that operate within a health care and social environment. Hall and colleagues talk about physician-enabling factors such as whether a provider accepts a specific type of health insurance, the length of time to get an appointment, the length of time a patient waits in the office, the process of making an appointment, acceptance of walk-in patients, and the geographic location of the provider.⁴

METHODS

I attempted to identify measures of availability by means of 3 search strategies: searches of the published literature; examination of the National Quality Measures Clearinghouse (<http://www.qualitymeasures.ahrq.gov>); and examination of results of an environmental scan for health care quality measures used in Medicaid/CHIP programs.

I conducted a Medline search of the English-language published literature from 2000 to 2009 for measures of availability of services by searching for the term “availability” along with “adolescent,” “child,” or “neonatal” (5653 articles); further limited by provider type including “doctor or physician” (216), “nurse” (76), “physical, occupational, speech, or specialized therapy” (17); and “hospital, emergency, critical care, long term care, or urgent care” (922). These terms were chosen to be relevant to the broad sweep of CHIPRA legislation measurement topics (ie, services to promote healthy birth, prevent disease, treat disease and ameliorate sequelae of acute and chronic conditions, across all provider types and settings). There is no MeSH term for health services availability or capacity in Medline/PubMed; therefore, I used the word “availability” as a search term. I did a test search with the term “access” but did not use this term in the final search because in a cursory review of the articles they identified, “realized access” or use of services were the focus rather than availability.

To select the articles for the focused review, I read all titles and deleted any that were clearly not relevant (the majority) to the measurement of availability. Abstracts for the remaining articles were reviewed, with any potentially relevant article pulled for a reading of the full text (18), and 5 were included in this review. Potentially relevant articles included any article that addressed the availability of care for children. Articles with no apparent relevance were not pursued further. As noted above, the intent of the original project was to quickly identify measures of availability as such, and we did not have the resources to have 2 individuals review all titles or abstracts.

Other articles were identified through examining the citation list of identified articles, as well as suggestions from AHRQ staff and other pediatric health services researchers. The National Quality Measures Clearinghouse (<http://www.qualitymeasures.ahrq.gov/>) was searched with the terms “availability” and “access.” To have a measure included in the clearinghouse, measure stewards must address the measure’s validity and reliability and note whether the

measure is in use and by whom (in a global sense), thereby providing a rough sense of measure feasibility. Finally, I examined measures identified in an AHRQ-supported environmental scan of Web sites to identify measures in use by Medicaid and CHIP programs.⁵ International articles and measures were included if they were identified in my searches.

RESULTS

Results are grouped into 3 categories: 1) geographic availability, 2) timely availability, and 3) process availability. These groups broadly map to Donabedian’s² structural measures, and Aday and Anderson’s³ and Hall’s⁴ enabling factors. In summary, this focused review includes 11 measures of geographic availability (subdivided into counts/density, distance, and perceptions of availability), 7 on timeliness, and 4 on process availability (Table).

GEOGRAPHIC AVAILABILITY—MEASURES OF DENSITY AND DISTANCE

DENSITY

Simple measures of availability are counts of providers in specific geographic areas—for example, whether there is a children’s hospital or academic health center in the county or zip code.⁶ Other measures use relevant numerators and denominators to examine the density of specific types of providers (eg, primary care and behavioral health) for the child population in a state,^{7,8} number of pediatricians per 1000 children in the county,⁹ or number of pediatricians per 100 000 population age 14 and younger.¹⁰ By means of hospital referral regions, Mayer and colleagues examined the percentage of hospital referral regions with a provider, the average ratio of pediatric surgical subspecialists to pediatric population, the coefficients of variation of the ratios (the standard deviation divided by the mean multiplied by 100—a measure of dispersion¹¹).

Other geographic groupings include looking at supply of providers within care regions or designations of counties on the basis of travel plans of mothers of low-birth-weight infants from the resident county to the county of birth.¹² Supply has also been measured in zip code tabulation areas, which are Census Bureau tabulations of zip codes to group zip codes to better reflect census geographic units (<http://www.census.gov/geo/ZCTA/zcta.html>).¹³ Health Professional Shortage Areas (HPSAs) are areas formally identified as having a shortage of health care and are used to identify eligibility for federal and state programs. They are based on population-provider ratios in “rational service areas.” Rational service areas are counties or communities defined by common characteristics. Hospital referral regions are regional market areas for tertiary medical care created by the Dartmouth Atlas of Medical Care.¹⁴ Medically underserved areas (MUAs) are similar to HPSAs and are based on an index composed of the ratio of primary care medical physicians, infant mortality rate, the percentage living below the poverty level, and the percentage aged 65 and older.

Table. Description of Identified Measures

Geographic availability
Density
<ul style="list-style-type: none"> • Counts/density of providers in an area <ul style="list-style-type: none"> • Counts of providers by zip code • Density for the child population in a state or other geographic area • Counts or density of providers who serve children with Medicaid/Children's Health Insurance Program • Density of a type of specialist for children with relevant conditions • Density accounting for diminished access as distance increases • Health Professional Shortage Area • Neonatal or primary care area • Distance <ul style="list-style-type: none"> • Straight line • Drive time to a provider • Travel time (driving or air) to a provider • Provider perceptions of availability
Timeliness
<ul style="list-style-type: none"> • Scheduling • Length of time to appointment • Length of time to get an appointment if a person is sick • Transportation assistance • Intensive care unit (ICU) measures <ul style="list-style-type: none"> • Percentage of ICU patients not admitted because of inadequate resources • Percentage of elective surgical cases deferred or canceled because of bed shortage • Percentage of patients transferred to another facility as a result of lack of ICU bed • Percentage of patients with discharge delayed more than 12 hours • Percentage of patients discharged between 6 PM and 6 AM • Plan members' experiences getting care quickly • Transfers
Process availability
<ul style="list-style-type: none"> • Barriers to care (pragmatics, skills, expectations, marginalization, knowledge, and beliefs) • Patient (or patient proxy) reports of ease of getting specific types of care: <ul style="list-style-type: none"> • Patient (or patient proxy) reports of ease of getting needed care • Patient (or patient proxy) reports of ease of getting prescription medications • Patient (or patient proxy) reports of ease of getting specialized services • Patient (or patient proxy) reports of ease of getting needed information • Acceptance/nonacceptance of new patients with Medicaid/Children's Health Insurance Program

Some of these measures have been tested for validity, ie, the relationship between the measure of availability and desirable processes or outcomes of care, with varying results. A lower supply of neonatologists is related to mortality.¹⁵ Availability of family planning services within a zip code tabulation area was not related to the risk of unintended pregnancies but was correlated with a lower risk of teenage pregnancies.¹² Coyte and colleagues examined the number of specialists (otolaryngologists) per 1000 children in Canada and refined the measure to account for the percentage of surgeries performed for individuals in a specific county. Even with this adjustment, this measure was not related to surgery rates in this Canadian study.¹⁰

DENSITY FOR MEDICAID/CHIP PROVIDERS

Further variations of density measures include determining whether local providers serve children with Medicaid or CHIP coverage,¹⁶ including providers who accept new patients, and providers who accept new patients with a particular (eg, Medicaid or CHIP) medical plan.³ The measures can also be refined by examining only children who would need a service.

The state of Maine examines the number of MaineCare (Medicaid) members enrolled in a site divided by the number of physicians at the site to assure that providers are not over-subscribed (<http://www.gpo.gov/fdsys/pkg/FR-2009-12-29/html/E9-30802.htm>). Dasanayake and colleagues examined whether there was a dental service provider participating in Medicaid in the child's county of residence.¹⁷ This study showed associations of supply with the use of dental care. Lee and colleagues examined the ratio of children with diabetes to the number of board-certified pediatric endocrinologists.¹⁸ This study showed large variations in this ratio by region.

DISTANCE

Other measures account for geography to try and better capture supply that is relevant to an individual patient. These include measures of straight-line distance,¹⁹ whether a patient lives within a 30-minute drive time of a provider,³ and access by ground or air within 60 minutes to a pediatric trauma center.²⁰ These measures can be summarized at the population level (eg, average distance or percentage of a population with a commute of less than 30 or 60 minutes). An alternative is to geocode addresses and use the kernel density method. This method accounts for a decay in accessibility as distances increase and is based on the assumption that the influence of a provider is greater the closer a patient is to that provider.

One study examined availability of psychiatrists, psychologists, and counselors and showed correlations between low provider coverage and the percentage of the population with public assistance, the percentage of female headed households, and the percentage of the population that was African American, suggesting some concurrent validity for the measure.¹⁷ However, the measure of availability was extremely difficult to construct, suggesting that the approach in this study may not be feasible for routine use. A similar study that used a version of the kernel density method showed large disparities in spatial accessibility for black children compared to children of other races and showed that there was more utilization in areas with greater spatial accessibility.²¹ Nance and colleagues²⁰ examined the percentage of children within 1 hour's flying or driving time to a pediatric trauma center and described variation by state. Mayer and colleagues computed straight-line distance between each pediatric surgical specialty and each geographic zip code centroid in the United States. Zip codes were then grouped by the distance to a subspecialty.¹¹

PERCEIVED AVAILABILITY

An alternative approach to objectively measuring availability used by Bale and colleagues examined pediatricians'

perceptions about the availability of pediatric neurologists nationally and in their own local areas.²² This is an intriguing approach because providers may be less likely to refer a patient if they think that services are not available. Similar to this, state CHIP programs were asked in a survey whether they believed that the primary and/or specialty provider capacity for their program was adequate.²³ They reported a greater lack of availability for subspecialties previously reported to be inaccessible (mental health and dental), but shortages of pediatricians, other primary care providers, and other types of specialists as well. The validity of these survey measures has not been tested. This study did not correlate availability with use of care or health status.

LIMITATIONS AND STRENGTHS

Currently available measures of density do not perfectly capture the group of providers truly available to individuals in specific geographic areas, and the measures of geography may not reflect the community that is relevant to an individual. For example, the American Medical Association master file is thought to overestimate active physicians at older ages as a result of delays in reporting of retirements. Further, these data do not perfectly represent time spent in clinical activity.²⁴ Counts of children's hospitals based on National Association of Children's Hospitals and Related Institutions data exclude hospitals that are not members. Provider information can be improved by using multiple data sources and validating the information by calling providers.²⁵

Refinements to determine whether a provider covers children with Medicaid (or other insurers) can be done with lists of covered providers from insurance data. However, to know whether providers are truly open requires asking practices whether they have open panels for specific types of insurance.

Defining the appropriate geographic area to measure availability is another challenge. For example, is it appropriate to use the same measures of geographic accessibility in densely populated and sparsely populated areas? Availability may depend on the mode of transportation. In some cases, more geographically distant providers could be more convenient to families.

It could be useful to have some defined standards of availability such that anything that fell beyond the predesignated range could be considered poor availability, or conversely, too much availability would be considered oversupply. To do this, there needs to be consensus on appropriate geography or distance for measuring availability and the appropriate level and type of available services. The HPSAs and other measures of need (eg, MUA) attempt to address these needs by setting specific criteria for eligibility for government aid, but the validity, utility, and scope of these methods have been contested.²⁶ Further, although there is some attention to children in each method (eg, the MUA method of assessing needs incorporates a measure of infant mortality; the HPSA measure of primary care providers includes pediatricians; the HPSA measure for mental health providers includes a youth ratio), neither method is specific to the particular requirements in children's health care.

TIMELY AVAILABILITY

Even if providers are present in a community, they may not be truly available to patients in a timely fashion. Timeliness is one of the key domains of quality identified by the Institute of Medicine and used in federal reports of quality and disparities.²⁷ Parent-reported length of time to an appointment and obtaining care when needed are commonly used measures of timely availability in surveys. Studies have also used measures of transfers or deferred care. The Consumer Assessment of Healthcare Providers and Systems (CAHPS) measures plan members' experiences with getting care quickly. CAHPS measures have been developed to ensure that they address important aspects of care²⁸ and are reliable.^{29,30} The CAHPS questions ask the parents' perception of how often the child got care for an illness, injury, or condition as soon as needed, and whether a child could get a routine appointment as soon as needed (<http://www.cahps.ahrq.gov>).

Hall and colleagues examine measures of how long it takes to get an appointment and how long it takes to get an appointment if the person is sick.⁴ Klerman and colleagues examined availability characteristics of family planning clinics, including scheduling (full time, evening hours, weekend hours) and waiting time (<1 week for appointments and <30 minutes in the clinic), and whether public transportation or transportation assistance was available. They found differences in these characteristics by state, type of organization, and the presence or absence of Title X funding.³¹

Measures of timeliness from the provider perspective have also been created. The Australian Council on Healthcare Standards (<http://www.achs.org.au>) has a set of measures of timeliness of intensive care unit (ICU) availability. The measures include the percentage of appropriate patients referred to the ICU who were not admitted because of inadequate resources, percentage of elective surgical cases deferred or canceled as a result of a lack of an ICU bed, the percentage of patients who were transferred to another facility/area/ICU as a result of unavailability of an ICU bed, percentage of patients whose discharge from the ICU was delayed more than 12 hours, and percentage of patients discharged from the ICU between 6 PM and 6 AM.³² This type of measure could be modified for use in the United States and for settings other than the ICU. Similarly, a study of the use of neonatal intensive care in the UK examined transfers as an indicator of the lack of sufficient services. The criteria used were based on the Clinical Standards Advisory Group identifying 2 types of transfers that were unequivocally not good practice.³³ The National Healthcare Quality Report reports on 2 measures of emergency department waiting time, developed for the Centers for Disease Control and Prevention's National Hospital Ambulatory Care Survey.³⁴

PROCESS AVAILABILITY—BARRIERS

Other, typically questionnaire-based measures examine factors that potentially interfere with the use of care—that is, barriers to care. We anticipate that more barriers

will relate to services being functionally less available to patients even if they are present in a community. For example, if a community has a pediatric cardiology services but it is not possible to get an appointment, then those services are functionally not available. CAHPS measures plan members' experiences with the ease of getting needed care, prescription medications, specialized services, and needed information (the latter 3 measures are currently in the set for children with chronic conditions, but the SNAC recommended that they be collected for all children). As noted above, CAHPS assesses the reliability of their measures.^{26,27}

The Barriers to Care Questionnaire (BCQ) developed by Seid and colleagues asks about experiences or circumstances that might interfere with access to or use of care and has subscales related to pragmatics, skills, expectations, marginalization, knowledge, and beliefs. Results of psychometric testing are favorable.³⁵ In a study of the correlations of barriers with parent-reported quality, Seid found that the summary BCQ measure (total scale and subscales) was statistically significantly moderately correlated with overall quality, access, coordination, comprehensiveness, communication, and accumulated knowledge, but not continuity.³⁶

DISCUSSION

RECOMMENDATIONS BY SNAC AND THE SECRETARY OF THE HHS

Only 2 measures of availability of services were nominated for potential inclusion in the initial core set of children's health care quality measures for voluntary use by Medicaid and CHIP by August 2009 (before this paper was completed and during the process of this review)³⁷: 1) access to primary care practitioners by age and total, and 2) unduplicated members served per provider. Only the first measure was included in the initial, recommended core set posted for public comment in December 2009.^{35,38} CAHPS was also recommended by the SNAC and posted for public comment, but the SNAC did not specifically recommend that the items discussed in this paper be used to measure availability of services. However, the data are certainly available for this purpose.

FUTURE DIRECTIONS

Geographic measures remain imperfect, although they should be considered for future inclusion in the quality measure set. To improve our understanding of availability, it would be possible to use multiple measures of availability. Even with this, measurement is imprecise. That said, these measures can at least identify groups of individuals for whom availability of care may be an issue. A crude measure of density based on Census and Medicaid/CHIP data may be a good early measurement step. This could later be refined to look at availability in a market area as well as whether providers will take new Medicaid patients. Identifying underserved areas (similar to the HPSA or MUAs) is another potentially useful approach. The Patient

Protection and Affordable Care Act calls for a reworking of the HPSA and MUA. The result of these efforts may be useful to include in the future.

The CAHPS timeliness items seem most feasible for use in the near term. Some Medicaid and CHIP health plans report CAHPS data to the National Committee for Quality Assurance now. The CAHPS Medicaid 4.0 survey, including use of the Children with Chronic Conditions survey for all children, was recommended for the core set of measures by the SNAC and was included in the publicly posted set of core measures. Centers for Medicare & Medicaid Services, Medicaid, and CHIP programs could use CAHPS data to report on timeliness once the CHIPRA requirement for state programs to use CAHPS is implemented. That said, providers and policy makers may disregard parent reports. Further elucidation of the validity of CAHPS items will be helpful.

Future efforts could focus on the timeliness of the availability of specialty services, especially focusing on areas where low availability is suspected (eg, dental, mental health, and other subspecialty care). The BCQ taps important domains, but implementing it would likely require a new survey initiative; thus, this tool should be considered for future expanded efforts at capturing information about availability of services for children.

As these and other measures get used in additional research projects and assessments of care, they may be further refined, and the domains of availability that are most important may change. Ongoing assessment of the published literature and the data from measurement sets should be used to refine the initial core measurement set developed in response to the CHIPRA legislation. Determining whether the CAHPS questions could be expanded to ask about other aspects of timeliness and barriers would be useful.

Clearly, more work to assess the reliability and validity of existing measures of availability of services for children would be helpful. It will also help to determine whether and how to use sets of measures. More research is also needed about identifying appropriate levels of geographic areas for measurement. Some of these decisions require trade-offs between data that are easily available and types of data that more accurately reflect relevant geographic areas. It is likely that different geographic areas will be appropriate for different types of care. There is also little evidence about how various measures might be used in groups to create a more comprehensive and meaningful picture of availability. As technology changes, the field will need to consider whether and how to capture care provided via telehealth or distant consults.

LIMITATIONS

This review was limited in its scope, providing a focused and not fully systematic review. The lack of a single MeSH term for availability made a quick systematic review nearly impossible. The timing of the process for identifying an initial recommended set of children's health care quality measures for voluntary use by Medicaid and CHIP did not allow for a careful, comprehensive approach to

considering topics that were beyond the usual approach to clinical quality measurement, such as availability of services.³⁵ The review was further limited by the lack of a robust and coordinated field of development of availability of services measures. For 30 years,²⁶ the HPSA and MUA measures have sufficed for policy purposes, despite their methodological shortcomings. Articles on other measures of availability were not specifically designed to test the reliability and validity of the availability measure, and often did not report on these features. Most articles were using availability data to test some hypothesis or fielding surveys to assess the extent of availability. It was beyond the scope of the review to independently examine the data sources and methods used in studies to assess whether they met standard criteria for measurement.

CONCLUSION

CHIPRA asked for a quality measure that focused on availability of services for children, a system-level topic that has not been a major focus of health care quality measurement previously. Few such measures were identified and all had shortcomings. In particular, available measures do not cover the full range of services needed by children. Fortunately, the CHIPRA legislation provided for a Pediatric Quality Measures Program to enhance existing measures and develop new measures of children's health care quality to meet the priorities of a broad range of stakeholders.

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